Week 9 SI Answers

1. a. $\frac{\pi}{4}$ b. $\frac{\pi}{6}$ c. $-\frac{5\pi}{6}$

2. a. $\cos^{-1}\left(\cos\frac{5\pi}{6}\right) \Rightarrow \cos^{-1}\left(\frac{1}{2}\right) = \boxed{\frac{\pi}{3}}$

b. $\tan\left(\arctan\left(-\frac{\sqrt{3}}{3}\right)\right) \Rightarrow \tan\left(-\frac{\pi}{6}\right) = \boxed{-\frac{\sqrt{3}}{3}}$

c. $\arctan\left(\tan\left(\frac{5\pi}{6}\right)\right) \Rightarrow \tan^{-1}\left(-\frac{\sqrt{3}}{3}\right) = \boxed{-\frac{\pi}{6}}$

3. a. $\cos^{-1}\left(\cos\left(\frac{17\pi}{9}\right)\right)$ - recall range for $\cos^{-1}$ is $[0, \pi]$, & $\frac{17\pi}{9}$ is outside that. Find reference angle.

$\cos^{-1}\left[\cos\left(\frac{\pi}{9}\right)\right) = \boxed{\frac{\pi}{9}}$

b. $\sin\left(\sin^{-1}(3)\right)$

- $\sin^{-1}(3) =$ undefined, so $\sin\left(\sin^{-1}(3)\right)$ is undefined

c. $\sin^{-1}\left(\sin\left(-\frac{2\pi}{9}\right)\right)$ - range of $\sin^{-1}$ is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, which $-\frac{2\pi}{9}$ falls in to

$\boxed{-\frac{2\pi}{9}}$

d. $\tan^{-1}\left(\tan\left(-\frac{6\pi}{5}\right)\right)$ - $-\frac{6\pi}{5}$ is in the domain of tan, but not in the domain of $\tan^{-1}$. Reference angle for this is $-\frac{\pi}{5}$.

$\tan\theta = \tan\left(-\frac{6\pi}{5}\right)$

$\tan\theta = \tan\left(-\frac{\pi}{5}\right)$

$\theta = \tan^{-1}\left(\tan\left(-\frac{\pi}{5}\right)\right)$

$\theta = \boxed{-\frac{\pi}{5}}$